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| 10/663,863 | 09/16/2003 | Anthony Gerard Gibart | 03AB082 | 3139 |

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MEHRMANESH, ELMIRA

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| ART UNIT | PAPER NUMBER |
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2113

DATE MAILED: 05/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/663,863

Applicant(s)

GIBART ET AL.

Examiner

Elmira Mehrmanesh

Art Unit

2113

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 September 2003.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-30 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-30 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on November 17 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

The application of Gibart et al., for a "High speed synchronization in dual-processor safety controller" filed September 16, 2003, has been examined.

Claims 1-30 are presented for examination.

Information disclosed and listed on PTO 1449 has been considered.

Claims 1-9, 12-30 are rejected under 35 USC § 102.

Claims 10, 11 are rejected under 35 USC § 103.

Claim Objections

Claim 23 is objected to because of the following informalities: Claim 23 is dependent on claim 26. It is believed that claim 23 was intended to be dependent on claim 17 instead of claim 26. Examiner suggests the change of the claim 23 to depend on claim 17. Appropriate correction is required.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-9 and 12-30 are rejected under 35 U.S.C. 102(b) as being anticipated by Danielsen et al. (U.S. Patent No. 5,136,704).

As per claim 1, Danielsen discloses a safety controller comprising:

a first and second processing unit (Fig. 3, Processor A and Processor B) communicating on a communication bus (Fig. 3, element 12, 14), each including a processor (Fig. 4, Processor A and Processor B) and memory (Fig. 4, elements 42, 44), the memory of each of the first and second processing units loadable with a common safety program and input/output variables, wherein the safety program is repeatably executable to read input variables representing inputs from external controlled devices and write output variables representing outputs to external controlled devices (col. 3, lines 1-8)

a coordinator program providing each of the first and second processing units with identical input variables at a predetermined point in the repeated execution of the common safety programs (col. 3, lines 9-21)

a synchronization program (col. 5, lines 51-61) executable by the first and second processing units to execute the common safety programs (col. 3, lines 1-8) and to compare execution of the common safety programs and to enter a safety state when this execution differs (col. 3, lines 57-68 through col. 4, lines 1-5).

As per claim 2, Danielsen discloses in the coordination program provides identical input variables at only a single point in the repeated execution of the common safety programs (col. 5, lines 51-61).

As per claim 3, Danielsen discloses the predetermined point in the repeated execution of the common safety programs is the start of the common safety programs (col. 5, lines 51-61).

As per claim 4, Danielsen discloses the synchronization program compares execution of the safety program by comparing output variables generated by the first and second processing unit executing the safety program (col. 3, lines 57-68 through col. 4, lines 1-5).

As per claim 5, Danielsen discloses the safety program is executed repeatedly and wherein the comparison of the output variables is performed at the conclusion of each repeated execution immediately prior to outputting of the output variables to the external controlled device (col. 3, lines 53-64).

As per claim 6, Danielsen discloses the safety program also executes to generate values of internal variables different from the input and output variables and wherein the synchronization program compares execution of the safety program by comparing values of internal variables generated by the first and second processing unit executing the safety program (col. 4, lines 23-41).

As per claim 7, Danielsen discloses the safety program is executed repeatedly and wherein the comparison is performed at a period greater than the repetition period

(col. 3, lines 57-68 through col. 4, lines 1-5).

As per claim 8, Danielsen discloses the coordination program stops the common safety programs execution at the predetermined point in the repeated execution of the common safety program until the identical input variables have been provided to the common safety programs (col. 4, lines 6-20).

As per claim 9, Danielsen discloses identical input variables are provided by copying of input variables from the first processing unit to the second processing unit (col. 6, lines 7-17).

As per claim 12, Danielsen discloses the first processing unit includes a buffer memory (Fig.11, element 121) receiving input variables asynchronously and wherein the coordination program copies the buffer memory identically to memory in each of the processing units (Fig. 11, element 122) and (col. 6, lines 7-17).

As per claim 13, Danielsen discloses the synchronization program combines the output variables when the execution of the common safety program does not differ to produce a single set of output variables transmittable to the controlled device. Figure 11 shows input port 136 and output port 135 are combined in the switch 138 and result in an output from the switch.

As per claim 14, Danielsen discloses the combination creates a message having one output variable concatenated to the value of the output variable complemented (col. 6, lines 7-17).

As per claim 15, Danielsen discloses a safety controller comprising:
a first and second processing unit (Fig. 3, Processor A and Processor B) each including a processor (Fig. 4, Processor A and Processor B) and memory (Fig. 4, elements 42, 44), the memory of each of the first and second processing units loadable with a common safety program and input/output variables, wherein the safety program is repeatably executable to read input variables representing inputs from external controlled devices and write output variables representing outputs to external controlled devices (col. 3, lines 1-8)

a synchronization program (col. 5, lines 51-61) executable by the first and second processing units to execute the common safety programs (col. 3, lines 1-8) and to compare execution of the common safety programs and to enter a safety state when this execution differs (col. 3, lines 57-68 through col. 4, lines 1-5)

wherein the synchronization program compares execution of the safety program by comparing outputs generated by the first and second processing unit executing the safety program at the conclusion of each repeated execution immediately prior to outputting of the output values to the external device (col. 3, lines 53-64).

As per claim 16, Danielsen discloses a safety controller comprising:

a first and second processing unit (Fig. 3, Processor A and Processor B) communicating on a communication bus (Fig. 3, element 12, 14), each including a processor (Fig. 4, Processor A and Processor B) and memory (Fig. 4, elements 42, 44), the memory of each of the first and second processing units loadable with a common safety program and input/output variables, wherein the safety program is repeatably executable to read input variables representing inputs from external controlled devices and write output variables representing outputs to external controlled devices (col. 3, lines 1-8)

a synchronization program (col. 5, lines 51-61) executable by the first and second processing units to execute the common safety programs (col. 3, lines 1-8) and to compare execution of the common safety programs and to enter a safety state when this execution differs (col. 3, lines 57-68 through col. 4, lines 1-5)

wherein the synchronization program compares execution by comparing output variables and intermediate variables at different periods (col. 3, lines 57-68 through col. 4, lines 1-5).

As per claim 17, Danielsen discloses a method of operating a safety controller having a first and second processing unit (Fig. 3, Processor A and Processor B) each including a processor (Fig. 4, Processor A and Processor B) and memory (Fig. 4, elements 42, 44), the memory of each of the first and second processing units loadable with a common safety program and input/output variables, wherein the safety program is repeatably executable to read input variables representing inputs from external

controlled devices and write output variables representing outputs to external controlled devices (col. 3, lines 1-8), the method comprising the steps of:

(a) providing each of the first and second processing units with identical input variables at a predetermined point in the repeated execution of the common safety programs (col. 6, lines 7-17) and (col. 5, lines 51-61)

(b) executing by the first and second processing units the common safety programs and comparing execution of the common safety programs to enter a safety state when this execution differs (col. 3, lines 57-68 through col. 4, lines 1-5).

As per claim 18, Danielsen discloses step (a) provides identical input variables at only a single point in the repeated execution of the common safety programs (col. 5, lines 51-61).

As per claim 19, Danielsen discloses the predetermined point in the repeated execution of the common safety programs is the start of the common safety programs (col. 5, lines 51-61).

As per claim 20, Danielsen discloses step (b) compares execution of the safety program by comparing output variables generated by the first and second processing unit executing the safety program (col. 3, lines 57-68 through col. 4, lines 1-5).

As per claim 21, Danielsen discloses the safety program is executed repeatedly and wherein step (b) is performed at the conclusion of each repeated execution immediately prior to outputting of the output variables to the external controlled device (col. 3, lines 53-64).

As per claim 22, Danielsen discloses the safety program also executes to generate values of internal variables different from the input and output variables and wherein step (b) compares execution of the safety program by comparing values of internal variables generated by the first and second processing unit executing the safety program (col. 4, lines 23-41).

As per claim 23, Danielsen discloses the safety program is executed repeatedly and wherein the comparison is performed at a period greater than the repetition period (col. 3, lines 57-68 through col. 4, lines 1-5).

As per claim 24, Danielsen discloses step (a) stops the common safety program's execution at the predetermined point in the repeated execution of the common safety program until the identical input variables have been provided to the common safety programs (col. 4, lines 6-20).

As per claim 25, Danielsen discloses identical input variables are provided by copying of input variables from the first processing unit to the second processing unit

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(col. 6, lines 7-17).

As per claim 26, Danielsen discloses the first processing unit includes a buffer memory (Fig.11, element 121) receiving input variables asynchronously and wherein step (a) copies the buffer memory identically to memory in each of the processing units (col. 6, lines 7-17).

As per claim 27, Danielsen discloses step (b) combines the output variables when the execution of the common safety program does not differ to produce a single set of output variables transmittable to the controlled device. Figure 11 shows input port 136 and output port 135 are combined in the switch 138 and result in an output from the switch.

As per claim 28, Danielsen discloses the combination creates a message having one output variable concatenated to the value of the output variable complemented (col. 6, lines 7-17).

As per claim 29, Danielsen discloses a method of operating a safety controller having a first and second processing unit (Fig. 3, Processor A and Processor B) each including a processor (Fig. 4, Processor A and Processor B) and memory (Fig. 4, elements 42, 44), the memory of each of the first and second processing units loadable with a common safety program and input/output variables, wherein the safety program

is repeatably executable to read input variables representing inputs from external controlled devices and write output variables representing outputs to external controlled devices (col. 3, lines 1-8), the method comprising the steps of executing the common safety programs to compare execution of the common safety programs and to enter a safety state when this execution differs (col. 3, lines 57-68 through col. 4, lines 1-5)

where the comparison of execution compares outputs generated by the first and second processing unit executing the safety program at the conclusion of each repeated execution immediately prior to outputting of the output values to the external device (col. 3, lines 57-68 through col. 4, lines 1-5).

As per claim 30, Danielsen discloses a method of operating a safety controller having a first and second processing unit (Fig. 3, Processor A and Processor B) each including a processor (Fig. 4, Processor A and Processor B) and memory (Fig. 4, elements 42, 44), the memory of each of the first and second processing units loadable with a common safety program and input/output variables, wherein the safety program is repeatably executable to read input variables representing inputs from external controlled devices and write output variables representing outputs to external controlled devices (col. 3, lines 1-8), the method comprising the steps: of executing the common safety program on the first and second processing units and comparing execution of the common safety programs to enter a safety state when this execution differs wherein the comparison compares execution by comparing output variables and intermediate variables at different periods (col. 3, lines 57-68 through col. 4, lines 1-5).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Danielsen et al. (U.S. Patent No. 5,136,704) in view of Griffin et al. (U.S. Patent No. 6,928,583).

As per claim 10, Danielsen fails to explicitly disclose a backplane.

Griffin teaches:

the communication bus is a backplane having releasable electrical connectors allowing connection of the first and second processing unit to and from the backplane (col. 13, lines 20-39).

As per claim 11, Danielsen fails to explicitly disclose a serial bus.

Griffin teaches:

the communications bus is a serial communications network having releasable electrical connectors allowing connection of the first and second processing unit to and from the serial communication bus (col. 3, lines 45-53).

It would have been obvious to one of ordinary skill in the art at the time the invention to use the method of fault tolerance of Griffin et al. in the redundant microprocessor control system of Danielsen et al. to detect faults in the dual processing systems.

One of ordinary skill in the art at the time the invention would have been motivated to make the combination because Danielsen et al. disclose a redundant microprocessor system and method that features a high level of safety with improved reliability by comparison of outputs generated by two processors in synchronization (col. 3, lines 11-21). Danielsen et al. system uses a bus for communication between the two processing elements (Fig. 3, element 12).

Griffin et al. discloses a method for a first computing element and a second computing element to execute in lockstep in a fault-tolerant server. Fault detection is performed by output comparison (col. 2, lines 12-26). Griffin et al. uses a communication bus for communication between the two processing elements (Fig. 1, element 30).

Related Prior Art

The following prior art is considered to be pertinent to applicant's invention, but nor relied upon for claim analysis conducted above.

Vasko et al. (U.S. Patent No. 6,915,444), "Network independent safety protocol for industrial controller using data manipulation techniques".

Safford et al. (U.S. Patent No. 7,003,691), "Method and apparatus for seeding differences in lock-stepped processors".

Fourre et al. (U.S. Patent No. 4,520,482), "Safety controller".

Landry et al. (U.S. Patent No. 5,434,997), "Method and apparatus for testing and debugging a tightly coupled mirrored processing system".

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Elmira Mehrmanesh whose telephone number is (571) 272-5531. The examiner can normally be reached on 8-5 M-F.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert W. Beausoliel can be reached on (571) 272-3645. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.


Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for

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Status information for unpublished applications is available through Private PAIR only.

For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


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